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## ABSTRACT

Effective use of ICT (Information and Communications Technologies) by student teachers is vital if these technologies are going to be successfully used in the education of children in schools. An earlier study identified three main obstacles that could have limited ICT uptake by student teachers in 1996/97: student access to computers; the ICT policy adopted by initial teacher training providers; and the lack of encouragement for students to use ICT in teaching practice. This paper presents a comparative study of the ICT competence and attitudes of a similar cohort of student teachers in the 1999/2000 academic year, attending a one-year Postgraduate Certificate in Education course to teach in United Kingdom secondary schools. It argues that, while the overall sample of 1999/2000 student teachers appeared to be more competent and confident in the use of ICT than in 1996/97, female and younger students lagged behind their male and older peers. This issue needs to be addressed in the ICT policy adopted by initial teacher training providers. (Contains 31 references.) (Author/MES)

## Effective Use of ICT by Student Teachers – Is It Improving?

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**Abstract:** Effective use of ICT by student teachers is vital if these technologies are going to be successfully used in the education of children in schools. An earlier study by this author identified three main obstacles that could have limited ICT uptake by student teachers in 1996/7: student access to computers, the ICT policy adopted by initial teacher training providers and the lack of encouragement for students to use ICT on teaching practice. This paper presents a comparative study of the ICT competence and attitudes of a similar cohort of student teachers in the current academic year (1999/2000). It argues that whilst the overall sample of current student teachers appeared to be more competent and confident in the use of ICT than in 1996/7, female and younger students lagged behind their male and older peers. This issue needs to be addressed in the ICT policy adopted by initial teacher training providers.

### Introduction

The purpose of this study is to investigate the changing use of ICT by student teachers. Data from the academic year 1999/0 is presented, together with data previously reported for the academic year 1996/7 (Murphy and Greenwood, 1998). The implications for ICT training provision within initial teacher training courses are considered in the light of these findings. The paper will therefore present an empirical study of ICT competence and attitudes in two cohorts of student teachers in a UK university, and contribute to the international debate concerning the low uptake of ICT by student and beginning teachers.

Research findings suggest that ICT is significantly under-used by student and beginning teachers. The problem is world-wide and many explanations are offered. Lack of resources or lack of access to resources in schools/initial teacher training (ITT) institutions has been suggested in the United States by Yopp (1993), Fisher (1996) and Topp, Mortenson and Grandgenett (1996); in Australia by Wild (1996), and in the United Kingdom by Byard (1995), Dearing (1997), Taylor (1997) and Murphy and Greenwood (1998). Lack of ICT experience and training at pre-service level (Oliver, 1994a and Wild, 1995 [Australian studies]) and of confidence in computing skills of both students teachers and teacher trainers (for example, Chen 1997 [China]) have also been implicated as factors leading to low student ICT uptake. Lack of opportunity (Dunn and Ridgway, 1994 [UK]), and lack of encouragement to use computers during school placement (Collison and Murray 1994 and Murphy and Greenwood 1998 [both UK]) and the predominance of other classroom pressures (Wild, 1996 [Australia]) may explain the low level of ICT use by students during school experience.

The importance of gender influences on ICT usage is in dispute. Reports from Summers (1990 [UK]) and McMahon and Gardner (1995 [UK]) suggest that male students are less anxious about and make more frequent use of ICT. Several other studies have reported that female students are less confident or knowledgeable than males about using computers (Blackmore *et al* 1992 [UK]; Oliver 1993 [Australia]; and Marshall 1997 [US]). In contrast, there are also many reports from the United States and Canada which indicate that there are no significant differences between the attitudes of male and female students, for example: Koochang (1989), Kay (1989); Hunt and Bohlin (1993), Marshall and Bannon (1986) and Woodrow (1991).

Conflicting reports have argued whether or not age is a significant factor in determining the extent of low student teacher ICT uptake (Woodrow 1991 [Canada], Blackmore 1992 and Liénard 1995, [both UK]). The age phase for which students are being trained to teach may also be significant in that Blackmore (1992)

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and Oliver (1994a) demonstrated respectively that primary-trained students were more anxious and used computers less than secondary-trained students, both findings later confirmed by Murphy and Greenwood (1998). Finally, results from Summers and Easdown (1996) indicate that the subject specialism of student teachers may influence the extent of ICT use. They reported that student teachers attending a UK university specialising in geography tended to use computers more in their teaching when compared with main subject history students.

## The Study

For the present study, two cohorts of students attending a one-year Postgraduate Certificate in Education (PGCE) course to teach in UK secondary level schools were compared. The extent that PGCE students used various ICT facilities in the year 1996/7 was compared with the use of similar facilities in the current academic year (1999/2000). The attitudes of the two groups of students towards ICT were also examined. Student groups completed questionnaires (see Murphy and Greenwood [1998] for the research instrument). The first part of the questionnaire consisted of questions designed to collect data concerning access to, training in and use of ICT, and the second part consisted of a set of items designed to measure attitudes towards ICT. Three pilot studies were carried out to test for reliability, validity and selection of items for the main questionnaire. Reliability was tested using an internal consistency method (Cronbach's Alpha coefficient [Cronbach 1990]), which yielded reliability coefficients with values higher than the 0.8 criterion which is regarded as internally viable (Bryman and Carter 1997). Estimates of concurrent validity were measured using Pearson's product moment correlation coefficient. Highly significant positive correlations were observed between positive attitudes and the frequent use of ICT.

## Findings

### Changes in the Sample Characteristics between 1996/7 and 1999/0

The sample characteristics of the 1999/2000 PGCE cohort of student teachers indicate that there has been a dramatic overall increase in many aspects of their ICT use since 1996/7 (See Tab. 1).

|                                     | 1996/7 PGCE<br>[n = 119] (%) | 1999/0 PGCE<br>[n = 165] (%) | Significance of difference in<br>mean response (p) |
|-------------------------------------|------------------------------|------------------------------|----------------------------------------------------|
| Access to home computer             | 14                           | 60                           | <0.001                                             |
| Access to home e-mail               | 9                            | 33                           | <0.001                                             |
| Use word-processing often           | 84                           | 73                           | Not significant                                    |
| Use e-mail often                    | 6                            | 55                           | <0.001                                             |
| Use Internet often                  | 19                           | 47                           | <0.001                                             |
| Use discussion lists often          | 1                            | 4                            | <0.001                                             |
| Use ICT in lesson preparation often | 55                           | 50*                          | Not significant                                    |
| Use ICT in teaching often           | 24                           | 35*                          | Not significant                                    |

\* these figures refer to teaching carried out PRIOR to starting the PGCE course – it is anticipated that the percentage use of ICT during school experience in 1999/0 will be much higher due to the current emphasis on ICT in the PGCE course.

Table 1: ICT use by PGCE students in 1996/7 and 1999/0

The percentage of students in these cognate samples who have access to a home computer has more than quadrupled in less than three years and a similar increase is observed for home e-mail access. The use of e-mail, the Internet and discussion lists have all shown highly significant increases – note the almost 10-fold

increase in e-mail users among student teachers since 1997. Differences in the mean response of PGCE groups from 1996/7 and 1999/0 regarding the extent they used word processing and how often they used ICT in lesson preparation and teaching were not significant. It would be expected that the percentage of the 1999/0 cohort of PGCE students often using ICT for teaching will be higher after their school experience.

Despite the fact that more students starting the PGCE course in 1999 were using ICT than in previous years, there remains the problem that significant numbers of current students entered the course with very little or no ICT experience (Tab. 2). In this sample, 1 in 5 students entering the PGCE course in 1999 had never used e-mail.

| Student group         | Never use Word Processing (%) | Never use E-mail (%) | Never use Internet (%) | Never use Discussion Lists (%) |
|-----------------------|-------------------------------|----------------------|------------------------|--------------------------------|
| PGCE 1996/7 (n = 119) | 3                             | 69                   | 23                     | 84                             |
| PGCE 1999/0 (n = 165) | 1                             | 20                   | 15                     | 65                             |

Table 2: Lack of ICT experience in PGCE students 1996/7 and 1999/0 (%)

The vast range in ICT competence of incoming students to the PGCE course is difficult to accommodate during the short period of time PGCE students spend in the initial teacher training institution. The students sampled in the current study attend the University for 10 weeks of their one-year course. A further 22 weeks are school-based. The problem is exacerbated by the relatively small amount of ICT being used by teachers and pupils in the schools. Mansell (1999) discusses a recent UK Office for Standards in Education analysis of the secondary curriculum based on inspections in 1997-98 which found that more than half of English secondary schools do not comply with national curriculum requirements in ICT. Teachers' lack of expertise in ICT is blamed for this shortfall. If ICT is to be effectively used in schools, then it is vital that the current student teachers receive sufficient ICT training to enable them to take the lead in this process. ICT is the one area of teaching in which the student teachers could generally be considered more competent than many class teachers.

In 1996/7 the percentage of male PGCE students often using e-mail, the Internet and discussion lists was markedly higher than female students (Murphy 1997). This is *not* the case in 1999/0 when it can be observed that there was little gender difference in the extent of use of these ICT facilities (Tab. 3). Since teaching is a female-dominated profession and the majority of PGCE students are females (approximately 75% female in this study), it is important that women student teachers use ICT as extensively as their male counterparts.

| Student group         | Often use E-mail (%) |        | Often use Internet (%) |        | Often use Discussion Lists (%) |        |
|-----------------------|----------------------|--------|------------------------|--------|--------------------------------|--------|
|                       | Male                 | Female | Male                   | Female | Male                           | Female |
| PGCE 1996/7 (n = 119) | 13                   | 4      | 38                     | 15     | 4                              | 0      |
| PGCE 1999/0 (n = 165) | 51                   | 57     | 54                     | 44     | 7                              | 3      |

Table 3: Gender and ICT use by PGCE students in 1996/7 and 1999/0

The reverse situation appears to be the case when comparing the effect of age on ICT use by PGCE students in 1996/7 and 1999/0 (Tab. 4). Whereas there was little effect of age in 1996/7 there now seems to be a difference, with the younger students making more use of e-mail, Internet and discussion lists.

| Student group       | Often use E-mail (%) |         | Often use Internet (%) |         | Often use Discussion Lists (%) |         |
|---------------------|----------------------|---------|------------------------|---------|--------------------------------|---------|
|                     | Under 25             | Over 25 | Under 25               | Over 25 | Under 25                       | Over 25 |
| PGCE 1996/7 (n=119) | 6                    | 6       | 21                     | 16      | 0                              | 2       |
| PGCE 1999/0 (n=165) | 65                   | 36      | 50                     | 40      | 5                              | 2       |

Table 4: Age and ICT use by PGCE students in 1996/7 and 1999/0 (%)

It appears, therefore, that the students entering the teaching profession in 1999/0 are more computer literate than those of three years ago. Whether this higher level of technical competence will translate into the more effective use of ICT in the classroom is less clear and partly depends on the attitudes of student teachers towards ICT.

#### Changes in Student Teacher Attitudes towards ICT between 1996/7 and 1999/0

The attitudes towards ICT held student teachers also appear to have changed over the past three years. A summary of these changes is presented in Table 5. Overall, as expected, the 1999/0 PGCE students indicated more positive ICT attitudes than those in 1996/7. However the desire for more ICT training was higher in 1999/0 than in 1996/7. This suggests that student teachers *still* feel that they are not well equipped to use ICT in their teaching.

|                 | Liking of Computers                                           | Confidence in using ICT                                                                 | Value of ICT in Education                                                    | Desire for more ICT Training                          |
|-----------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------|
| <b>Overall</b>  | More positive in 1999/0 than in 1996/7                        | More confident in 1999/0 than in 1996/7                                                 | More positive in 1999/0 than in 1996/7                                       | Stronger desire for training in 1999/0 than in 1996/7 |
| <b>Women</b>    | More positive in 1999/0 than in 1996/7                        | Much more confident in 1999/0 than in 1996/7 – still not as confident as male students. | More positive in 1999/0 than in 1996/7                                       | Stronger desire for training in 1999/0 than in 1996/7 |
| <b>Men</b>      | No significant difference between 1996/7 and 1999/0           | No significant difference between 1996/7 and 1999/0                                     | No significant difference between 1996/7 and 1999/0                          | Stronger desire for training in 1999/0 than in 1996/7 |
| <b>Under 25</b> | More positive in 1999/0 but less so than older students       | Less confident in 1999/0 than in 1996/7                                                 | More positive in 1999/0 than in 1996/7                                       | Stronger desire for training in 1999/0 than in 1996/7 |
| <b>Over 25</b>  | More positive than younger students in both 1996/7 and 1999/0 | Older students more confident than younger students in both 1996/7 and 1999/0           | Older students more positive than younger students in both 1996/7 and 1999/0 | Stronger desire for training in 1999/0 than in 1996/7 |

**Table 5:** Summary of Attitude Results (Mean Responses)

Regarding gender, there was a significant increase in the relative confidence of female to male students in using ICT between 1996/7 and 1999/0, although female students still appear to be less confident than males. Women students in 1999/0 also indicated an increased liking for computers and were more positive about the value of computers in education. The attitudes of male students in the sub-scales of liking, confidence and value of ICT in education did not show any significant change between 1996/7 and 1999/0. The implications of these results are that ICT training for student teachers must be concentrated more on the educational uses of ICT and should be made more female-friendly. Morgall (1993) draws a distinction between a context-oriented (feminine) approach to technology assessment and a technology-oriented (masculine) approach. Feminist approaches to systems design are centrally concerned with developing systems that allow women to enhance their competences and their confidence in the use of systems that are appropriate to the reality of their working lives (Webster 1996). In a teacher-training context, therefore, the emphasis should be changed from the current *requirement* to using ICT in the classroom to a demonstration of ways in which ICT can be used to enhance teaching and learning.

The relationship between age and attitudes to computers in 1999/0 was similar to that in 1996/7. Older students, despite making less use of e-mail and the Internet (see Tab. 4) displayed a greater liking for computers, more confidence in their use of ICT and more appreciation of the value of ICT in education than

the under 25 group. It is possible that the context(s) in which the under 25 students were using e-mail and Internet may have been totally unrelated to work involving teaching and therefore did not have any effect on their confidence in using ICT in a classroom situation. The implication of this finding is that teacher trainers must be made aware that younger students may be more apprehensive about using ICT during their school-based work and may require more practical assistance during their time in the initial teacher training institution.

## Conclusions

The overall level of ICT competence of incoming students to the PGCE course appears to be significantly higher in 1999/0 than in 1996/7. However, there is still an extremely wide range of competence that is difficult to accommodate during the short period of time PGCE students spend in the initial teacher training institution. Female and younger students indicate lower levels of confidence in using ICT. This problem should be addressed in the ICT policy of the institution, perhaps by a stronger concentration on the educational uses of ICT (including demonstration of good use by specialists and practical application by students).

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